

Rejection Under 35 U.S.C. § 103

The Examiner has rejected claims 1, 7, 10, 11, 12 and 15 under 35 U.S.C. 103(a) as being unpatentable over Greivenkamp, Jr. (U.S. 4,575,193) and Fukushima (U.S. 5,579,420). This rejection is respectfully traversed.

The prior art cited by the Examiner differs from the present invention in both structure, function and result. Greivenkamp, Jr. '193 teaches that an optical spatial frequency filter may be constructed using a pair of birefringent elements with a wave plate sandwiched between the birefringent elements. The wave plate changes the polarization state of light between the two birefringent elements. The purpose for changing the polarization state is to change the polarization state of a first color by a first amount and the polarization of a second color by a second amount so that the spatial frequency response is substantially color dependent.

The Fukushima filter removes all wavelengths except for a narrow band. This type of filter is known as a spectral filter, and is a type typically found in a multiplexing apparatus such as disclosed by Fukushima. In an apparatus of this type, shown in Exhibit A, portions of the beam with an undesirable wavelength are removed, shown schematically as beam 6 and beam 8. Thus, the total light power is reduced by the spectral filter.

In the present invention, the birefringent uniaxial crystal spatial filter does not remove wavelengths, rather it blurs certain high frequencies of the image projected on the filter. See Exhibit B. In a complex photographic image certain features, for example, a picket fence, may produce high frequencies in a digital image. If the image is sampled at a lower frequency aliasing is produced in the resulting sampled image. The present invention, a spatial filter, blurs the higher frequencies in the image, thereby preventing aliasing in the final image. The total light power remains essentially unchanged by the filter and the blurring is achieved by redistribution of the light.

The structural differences between Fukushima and the present invention are also significant. Birefringent elements 11 and 13 are wedge shaped rather than "a first plane plate and at least a second plane plate" as in the present invention. The Fukushima invention also specifies an additional elements 12 sandwiched between the two wedge shaped plates, which is a heated birefringent element, with a heater 18 for changing wave length characteristics. This structure

functions differently from the structure claimed in the present invention and would not serve "to reduce undersampling artifacts" in an imaging apparatus such as a digital camera as in the present invention.

The Examiner has rejected claims 10, 11, and 12, however, these claims depend from an independent claim clearly distinguishable from the prior art and are therefore also patentable over the prior art.

The Examiner has rejected claim 4 under 35 U.S.C. 103(a) as being unpatentable over Greivenkamp, Jr. '193 and Fukushima et al. (U.S. 5,646,399). This rejection is respectfully traversed.

The Fukushima '399 reference is for a turnable filter module. This filter module, which splits a first beam and a second beam, varies the center wavelength in the passband according to the center wavelength of the input light. Once again this is significantly different from the spatial filter in the present invention. The fact that Fukushima '399 mentions lithium niobate and lithium tantalate as possible materials to use in the tunable filter modulator does not make it readily obvious to use these materials in a spatial filter. A variety of materials is used in different applications throughout the optical industry; which includes microscopes, telescopes, tunable filters, spectral filters, and spatial filters. The fact that a particular material is used in one optical application does not mean that an inventor would randomly select that material from another application merely because it is used in the optical industry. In addition, the birefringent elements in Fukushima '399 are crystal wedge plates 74 and 76, which have been distinguished from the present invention above.

The Examiner has rejected claim 5 under 35 U.S.C. 103(a) as being unpatentable over Greivenkamp, Jr. '193 and Fukushima '420 as applied to claim 1 above, and further in view of Takatori et al. (U.S. 5,715,085). This rejection is respectfully traversed.

Claim 5 depends from an independent claim clearly distinguishable from the prior art. Since claim 5 adds additional limitations to a patentable independent claim, it is believed that claim 5 is patentable also.

The Examiner has rejected claim 13 under 35 U.S.C. 103(a) as being unpatentable over Grievenkamp, Jr. '193 and Fukushima '399, and in further view of Watanabe et al. (U.S. 3,784,734). This rejection is respectfully traversed.

The Watanable et al. reference cited by the Examiner is different from the present invention as further defined in dependent claim 8 in that the rhomboidal pattern is not "rotated about an optical axis of the imaging apparatus." This distinction combined with the fact that it is a dependent claim, which adds additional limitations to an independent claim clearly distinguished from the prior art above, indicates that claim 13 is patentable over the prior art.

Declaration Under 37 C.F.R. § 1.131

Attached is a Declaration Under 37 C.F.R. 1.131 and supporting documents showing a date of invention as early as August 3, 1995. Documents supporting diligence between the date of conception and reduction to practice show diligence in pursuing the invention. Thus, the Fukushima reference cited by the Examiner is predated by the Applicant's date of invention. It is noted that the Fukushima application was filed in Japan originally and therefore was not invented in the United States prior to the Applicant's date of invention. The Applicant's date of invention, however, precedes even the Japanese filing date.

CONCLUSION

If the Examiner is of the opinion that additional modifications to the claims are necessary to place the application in condition for allowance, he is invited to contact Applicant's attorney at the number listed below for a telephone interview and Examiner's amendment.

Respectfully submitted,



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